

IT IS CLAIMED:

1. A method for transmitting information over a link in a data network, the method comprising:

monitoring conditions on the link;

5 automatically enabling fragmentation on the link upon detecting the occurrence of a first condition; and

automatically disabling fragmentation on the link in response to detecting the occurrence of a second condition.

10 2. The method of claim 1 wherein the first condition relates to the detection of real-time traffic being carried over said link.

3. The method of claim 1 wherein the second condition relates to the detection of no real-time traffic being carried over said link for at least a predetermined time interval.  
15 T.

4. The method of claim 3 wherein the predetermined interval T is a value ranging from about 60 seconds to about 180 seconds.

20 5. A computer program product comprising a computer readable medium, the computer readable medium comprising computer code for implementing the method of claim 1.

25 6. The method of claim 1 wherein said monitoring includes receiving a first packet, said method further comprising:  
determining whether the first packet is associated with real-time traffic; and  
automatically disabling fragmentation on the link after determining that the first packet is not associated with real-time traffic.

7. The method of claim 6 wherein the automatic disabling of fragmentation occurs after a predetermined time interval T has elapsed during which time no packets associated with real-time traffic have been received.

5 8. The method of claim 6 further comprising automatically enabling fragmentation on the link in response to determining that the first packet is associated with real-time traffic.

10 9. A computer program product comprising a computer readable medium, the computer readable medium comprising computer code for implementing the method of claim 6.

10 10. The method of claim 1 further comprising:  
detecting an external signal from a first network device;  
15 determining whether the external signal is related to a real-time set-up signal for establishing at least one real-time connection on the link;  
automatically enabling fragmentation on the link in response to determining that the external signal is related to a real-time set-up signal; and  
automatically disabling fragmentation on the link in response to a determination  
20 that no real-time connections are currently established on the link.

11. The method of claim 1 wherein the first condition relates to detection of a real-time set-up signal for establishing at least one real-time connection on the link.

25 12. The method of claim 1 wherein the second condition relates a determination that no real-time connections are currently established on the link.

30 13. A computer program product comprising a computer readable medium, the computer readable medium comprising computer code for implementing the method of claim 10.

14. A method for transmitting information over a link in a data network, the method comprising:

configuring the link to include a dynamically adjustable FRAG\_SIZE value relating to a fragmentation size for packets carried on the link such that fragmentation will be performed on selected packets which have a size greater than the FRAG\_SIZE value; and

dynamically adjusting the FRAG\_SIZE value on the link in response to predetermined criteria.

15. ~~14.1~~ The method of claim 14 further comprising automatically adjusting the FRAG\_SIZE value in response to detecting real-time traffic being carried on the link to thereby cause fragmentation to effectively be enabled on the link.

16. The method of claim <sup>15</sup>~~14.1~~ further comprising increasing the FRAG\_SIZE value of the link in response to determining that no real-time traffic has been carried over the link for at least one predetermined time interval T.

17. The method of claim 16 further comprising continually increasing the FRAG\_SIZE value on the link over time so long as no real-time traffic is detected on the link.

18. The method of claim 17 further comprising limiting the increase of FRAG\_SIZE value to a maximum predetermined value which represents a maximum transmission unit size of packets to be carried over the link, thereby effectively disabling fragmentation on the link.

19. The method of claim 14 wherein the FRAG\_SIZE value is increased substantially linearly over time in response to no real-time traffic being detected on the link.

20. The method of claim 14 wherein the FRAG\_SIZE value is increased substantially exponentially over time in response to no real-time traffic being detected on the link.

5 21. The method of claim 1, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using a Frame Relay protocol.

10 22. The method of claim 1, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using a PPP multilink protocol.

15 23. The method of claim 1, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using an ATM protocol.

20 24. A computer program product comprising a computer readable medium, the computer readable medium comprising computer code for implementing the method of claim 14.

25 25. A method for providing adaptive fragmentation of information packets transmitted over a link of a data network, the method comprising:

monitoring conditions on the link;

25 automatically enabling fragmentation on the link upon detecting the occurrence of a first condition; and

automatically disabling fragmentation on the link in response to detecting the occurrence of a second condition.

30 26. The method of claim 25 wherein the first condition relates to the detection of real-time traffic being carried over said link.

27. The method of claim 25 wherein the second condition relates to the detection of no real-time traffic being carried over said link for at least a predetermined time interval T.

28. The method of claim 27 wherein the predetermined time interval T is a value ranging from about 60 seconds to about 180 seconds.

29. A computer program product comprising a computer readable medium, the computer readable medium comprising computer code for implementing the method of claim 25.

30. The method of claim 25 wherein said monitoring includes receiving a first packet, said method further comprising:

determining whether the first packet is associated with real-time traffic; and  
automatically disabling fragmentation on the link after determining that the first packet is not associated with real-time traffic.

31. The method of claim 30 wherein the automatic disabling of fragmentation occurs after a predetermined time interval T has elapsed during which time no packets associated with real-time traffic have been received.

32. The method of claim 30 further comprising automatically enabling fragmentation on the link in response to determining that the first packet is associated with real-time traffic.

33. The method of claim 25 further comprising:  
detecting an external signal from a first network device;  
determining whether the external signal is related to a real-time set-up signal for establishing at least one real-time connection on the link;  
automatically enabling fragmentation on the link in response to determining that the external signal is related to a real-time set-up signal; and

automatically disabling fragmentation on the link in response to a determination that no real-time connections are currently established on the link.

34. The method of claim 25 wherein the first condition relates to detection of a real-time set-up signal for establishing at least one real-time connection on the link.

35. The method of claim 25 wherein the second condition relates a determination that no real-time connections are currently established on the link.

36. A method for providing adaptive fragmentation of information packets transmitted over a link of a data network, the method comprising:

configuring the link to include a dynamically adjustable FRAG\_SIZE value relating to a fragmentation size for packets carried on the link such that fragmentation will be performed on selected packets which have a size greater than the FRAG\_SIZE value; and

dynamically adjusting the FRAG\_SIZE value on the link in response to predetermined criteria.

37. The method of claim 36 further comprising automatically adjusting the FRAG\_SIZE value in response to detecting real-time traffic being carried on the link to thereby cause fragmentation to effectively be enabled on the link.

38. The method of claim 37 further comprising increasing the FRAG\_SIZE value of the link in response to determining that no real-time traffic has been carried over the link for at least one predetermined time interval T.

39. The method of claim 38 further comprising continually increasing the FRAG\_SIZE value on the link over time so long as no real-time traffic is detected on the link.

40. The method of claim 39 further comprising limiting the increase of FRAG\_SIZE value to a maximum predetermined value which represents a maximum

transmission unit size of packets to be carried over the link, thereby effectively disabling fragmentation on the link.

41. The method of claim 36 wherein the FRAG\_SIZE value is increased substantially linearly over time in response to no real-time traffic being detected on the link.

42. The method of claim 36 wherein the FRAG\_SIZE value is increased substantially exponentially over time in response to no real-time traffic being detected on the link.

43. The method of claim 25, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using a Frame Relay protocol.

44. The method of claim 25, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using a PPP multilink protocol.

45. The method of claim 25, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using an ATM protocol.

46. A network device for transmitting information over a link in a data network, the network device comprising:

at least one CPU;

memory; and

at least one interface adapted to communicate using the link;

the network device being configured or designed to monitor conditions on the link;

the network device further being configured or designed to automatically enable fragmentation on the link upon detecting the occurrence of a first condition;

the network device further being configured or designed to automatically disable fragmentation on the link in response to detecting the occurrence of a second condition.

47. The network device of claim 46 wherein the first condition relates to the detection of real-time traffic being carried over said link.

48. The network device of claim 46 wherein the second condition relates to the detection of no real-time traffic being carried over said link for at least a predetermined time interval T.

49. The network device of claim 46 wherein:  
the network device is further configured or designed to receive a first packet via said link;

the network device is further configured or designed to determine whether the first packet is associated with real-time traffic; and

wherein the network device is further configured or designed to automatically disable fragmentation on the link after determining that the first packet is not associated with real-time traffic.

50. The network device of claim 49 wherein the automatic disabling of fragmentation occurs after a predetermined time interval T has elapsed during which time no packets associated with real-time traffic have been received.

51. The network device of claim 49 wherein the network device is further configured or designed to automatically enable fragmentation on the link in response to determining that the first packet is associated with real-time traffic.

52. The network device of claim 46 wherein:  
the network device is further configured or designed to detect an external signal from a first network device;



the network device is further configured or designed to determine whether the external signal is related to a real-time set-up signal for establishing at least one real-time connection on the link;

the network device is further configured or designed to automatically enable fragmentation on the link in response to determining that the external signal is related to a real-time set-up signal; and

wherein the network device is further configured or designed to automatically disable fragmentation on the link in response to a determination that no real-time connections are currently established on the link.

53. The network device of claim 46 wherein the first condition relates to detection of a real-time set-up signal for establishing at least one real-time connection on the link.

54. The network device of claim 46 wherein the second condition relates a determination that no real-time connections are currently established on the link.

55. The network device of claim 46 wherein the link is configured to include a dynamically adjustable FRAG\_SIZE value relating to a fragmentation size for packets carried on the link such that fragmentation will be performed on selected packets which have a size greater than the FRAG\_SIZE value; and

wherein the network device is further configured or designed to automatically adjust the FRAG\_SIZE value in response to detecting real-time traffic being carried on the link to thereby cause fragmentation to effectively be enabled on the link.

56. The network device of claim 55 wherein the network device is further configured or designed to increase the FRAG\_SIZE value of the link in response to determining that no real-time traffic has been carried over the link for at least one predetermined time interval T.

57. The network device of claim 56 wherein the network device is further configured or designed to continually increase the FRAG\_SIZE value on the link over time so long as no real-time traffic is detected on the link.

5 58. The network device of claim 57 wherein the network device is further configured or designed to limit the increase of FRAG\_SIZE value to a maximum predetermined value which represents a maximum transmission unit size of packets to be carried over the link, thereby effectively disabling fragmentation on the link.

10 59. The network device of claim 46, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using a Frame Relay protocol.

15 60. The network device of claim 46, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using a PPP multilink protocol.

20 61. The network device of claim 46, wherein the link includes at least one network device, and the network device is configured to transmit information over the link using an ATM protocol.

25 62. A system for providing adaptive fragmentation of information packets transmitted over a link of a data network, the system comprising:

means for monitoring conditions on the link;

means for automatically enabling fragmentation on the link upon detecting the occurrence of a first condition; and

means for automatically disabling fragmentation on the link in response to detecting the occurrence of a second condition;

30 wherein the first condition relates to the detection of real-time traffic being carried over said link; and

wherein the second condition relates to the detection of no real-time traffic being carried over said link.